

Site Need Statement

| General Reference Information | |
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| 1 * | Need Title: Advanced Approaches for Reducing Waste Volume Stored in DSTs |
| 2 * | Need Code: RL-WT088 |
| 3 * | <p>Need Summary: The volume of double-shell tank (DST) space is limited and may restrict the volume of single-shell tank (SST) waste retrieved for storage and staging in DSTs. Given the current SST retrieval schedule at Hanford, it is projected that additional DST space will be needed in the FY 2010 time frame. The Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) calls for evaluation of options and actions to increase available DST space in support of SST retrieval. The current process is to remove water through the 242-A Evaporator within administrative controls limiting waste concentration. Advanced approaches for reducing waste volumes sent to and contained within DSTs are needed to minimize the need for additional DST space and reduce the associated costs for storing and staging retrieved SST wastes. Possible options include treatment of retrieved SST waste to removal of LAW from that can then be stored or disposed waste for storage outside the DST System and developing a better understanding of waste concentration to relax administrative control on evaporator operations. Several options were discussed in the Tank Space Options Report, RPP-7702, issued in March 2001, to help increase the available DST waste storage space including raising the allowable waste levels, combining aging waste, using restricted tank capacity, concentrating to higher specific gravity, etc.</p> |
| 4 * | Origination Date: November 2000 |
| 5 * | Need Type: Technology Need |
| 6 | Operation Office: Office of River Protection (ORP) |
| 7 | Geographic Site Name: Hanford Site |
| 8 * | Project: Retrieval PBS No: RL-TW04 |
| 9 * | <p>National Priority:</p> <p><u>X</u> 1. High - Critical to the success of the EM program, and a solution is required to achieve the current planned cost and schedule.</p> <p>___ 2. Medium - Provides substantial benefit to EM program projects (e.g., moderate to high life-cycle cost savings or risk reduction, increased likelihood of compliance, increased assurance to avoid schedule delays).</p> <p>___ 3. Low - Provides opportunities for significant, but lower cost savings or risk reduction, may reduce the uncertainty in EM program project success.</p> |
| 10 | Operations Office Priority: High |
| Problem Description Information | |
| 11 | <p>Operations Office Program Description: The overall purpose of the Retrieve and Transfer DST Waste function is to provide feed to the Waste Treatment Plant (WTP) and receive waste from SSTs. A primary objective of this function is to provide the tank farm infrastructure necessary to deliver waste to the WTP within established specifications. The baseline end state of the Retrieve and Transfer DST Waste function is:</p> <ul style="list-style-type: none"> • Retrieval of all wastes from the DSTs • The safe, environmentally compliant transfer of this waste to the WTP • DSTs in a ready state for implementing closure and final disposal of the DST farms. <p>The overall purpose of the Retrieve and Transfer SST Waste function is to move the waste from the SSTs into preferred storage in the DST system. A primary objective of this function is to develop and test alternative and improved retrieval technologies to past-practice sluicing. As part of this effort Leak Detection Monitoring and Mitigation (LDMM) approaches are being developed for concurrent deployment. To support this effort Cold Test Training & Mock-up Facilities are being established. The baseline end state of the Retrieve and Transfer SST Waste function is:</p> |

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| | <ul style="list-style-type: none"> ○ Retrieval of all wastes from the SSTs ○ The safe, environmentally compliant transfer of this waste to the DSTs ○ ○ Store and stage SST waste in DSTs, and ○ - Place SSTs in a ready state for implementing closure and final disposal of the SST farms. <p>Store and stage SST waste in DSTs, and Place SSTs in a ready state for implementing closure and final disposal of the SST farms. SSTs in a ready state for implementing closure and final disposal of the SST farms. The volume of available tank storage space currently within the DST system is limited and may potentially restrict the volume of SST waste that can be retrieved and then stored in these DSTs. Given the current schedule for SST retrieval, it is projected that additional DST space will be needed in 2010. The M-45-00-01A modifications to the Tri-Party Agreement call for an evaluation of options for actions that could be taken to increase the available tank space for SST retrieval. The only currently active waste processing option for increasing available DST space is the removal of water by evaporation in the 242-A Evaporator. Other options were identified in RPP-7702. For continued safe storage of waste in the DSTs, administrative controls restrict how much the waste can be concentrated by this process. When the pretreatment and LAW vitrification plants are operating, this will become the baseline process for removing waste for the DSTs to make space for continued SST retrieval.</p> <p>Process technologies or scientific advances that will create options for increasing the available space in the DST's are needed. These technologies could be used in conjunction with the existing piping and infrastructure associated with the 242-A Evaporator as an enhanced waste management facility, could be separate units, or could be part of the waste treatment plant. Some possible approaches included: 1) removing a low activity waste (LAW) stream from the stored waste that would be suitable for storage outside a DST or disposal if converted to an acceptable waste form; 2) accelerating or improving the processing rate of the waste treatment plant, particularly the immobilization of the LAW fraction because this comprises the majority of the waste volume; 3) developing improved technical understanding that would relax administrative limits on evaporator operation; or 4) combining aging waste.</p> |
| 12 | <p>Need/Problem Description: The volume of available tank storage space currently within the DST system is limited and may potentially restrict the volume and rate at which SST waste that can be retrieved and then stored in these DSTs without constructing new DSTs at a large cost. Given the current schedule for SST retrieval, it is projected that additional DST space will be needed in 2010. The M-45-00-01A modifications to the Tri-Party Agreement calls for an evaluation of options for actions that could be taken to increase the available tank space for SST retrieval. The only currently active waste processing option for increasing available DST space is the removal of water by evaporation in the 242-A Evaporator. Other options were identified in RPP-7702. For continued safe storage of waste in the DSTs, administrative controls restrict how much the waste can be concentrated by this process. When the pretreatment and LAW vitrification plants are operating, this will become the baseline process for removing waste for the DSTs to make space for continued SST retrieval.</p> <p>Process technologies or scientific advances that will create options for increasing the available space in the DST's are needed to ensure optimal retrieval capabilities are available to retrieve SST waste. These technologies could be used in conjunction with the existing piping and infrastructure associated with the 242-A Evaporator as an enhanced waste management facility, could be separate units, or could be part of the waste treatment plant. Some possible approaches included: 1) removing a low activity waste (LAW) stream from retrieved SST waste or the other stored waste that would be suitable for storage outside a DST or disposal if converted to an acceptable waste form; 2) accelerating or improving the processing rate of the waste treatment plant, particularly the immobilization of the LAW fraction because this comprises the majority of the waste volume; 3) developing improved technical understanding that would relax administrative limits on evaporator operation; or 4) combining aging waste. Other approaches that may be worth considering also include: 1) electrodialysis reversal (EDR); 2) fractional crystallization, 3) cation exchanging molecular sieve, sized to allow sodium exchange, and to exclude strontium and larger alkali and actinide cations, and use a portable evaporators at the job location., 4) anion (nitrate, nitrite, carbonate, etc) destruction or separation.</p> |

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| <p>*** *** ***</p> | <p>Program Baseline Summary (PBS) No.: TW04 Work Breakdown Structure (WBS) No.: 5.02.02 TIP No.: TBD</p> |
| 13 | <p>Functional Performance Requirements: Current forecasting for DST space utilization and SST retrieval as identified in document Single-Shell Tank Retrieval Sequence and Double-Shell Tank Space Evaluation (RPP-8554) issued in September 2001 indicates that two new million gallon DST's will be needed by 2010 and this construction activity will require substantial budget resources. Additional tanks will be needed in succeeding years. Process alternatives, technical approaches, or alternative tank farm management practices are needed to effectively create this volume of tank space by this time. It is important that any individual solution be effective from a complete systems perspective.</p> |
| | <p>*** Schedule Requirements: Additional DST space will be needed in 2010.</p> |
| 14 | <p>Definition of Solution: Creation of sufficient DST space so that the SST retrieval schedule is maintained without needing to construct new DSTs, thus providing significant cost savings while maintaining project schedule. Any proposed solution must account for the entire systems effect on the waste treatment plant and tank farm operations.</p> |
| 15 * | <p>Targeted Focus Area: Tanks Focus Area (TFA)</p> |
| 16 | <p>Potential Benefits: Significant cost savings by not building additional DSTs, and the ability to maintain SST retrieval schedule and potentially enable accelerated retrieval and site risk reduction</p> |
| 17 * | <p>Potential Cost Savings \$150,000,000</p> |
| 18 * | <p>Potential Cost Savings Narrative: Current estimates are that each additional DST will cost \$75M and at least two new DSTs will need to be constructed through 2010 per document RPP-8554. Additional DSTs will be needed beyond the 2010 time-frame at a cost of roughly \$75,000,000 each. Planning studies have updated previous detailed estimates for construction of new DSTs.</p> |
| | <p>*** Technical Basis: Given the current schedule for SST retrieval, it is projected that additional DST space will be needed in 2010. The M-45-00-01A modifications to the Tri-Party Agreement calls for an evaluation of options for actions that could be taken to increase the available tank space for SST retrieval. The only currently active waste processing option for increasing available DST space is the removal of water by evaporation in the 242-A Evaporator. Other options were identified in RPP-7702. For continued safe storage of waste in the DSTs, administrative controls restrict how much the waste can be concentrated by this process. When the pretreatment and LAW vitrification plants are operating, this will become the baseline process for removing waste for the DSTs to make space for continued SST retrieval.</p> |
| 19 | <p>Cultural/Stakeholder Basis: Maintaining the schedule for retrieval of SST waste and storage in DSTs is a priority.</p> |
| 20 | <p>Environment, Safety, and Health Basis:</p> |
| 21 | <p>Regulatory Drivers: M-45-00-01A modifications to the Tri-Party Agreement</p> |
| 22 * | <p>Milestones: M-45-12-T01 (2/28/2002) Options report on assessment of actions that could be taken to increase available tank space for SST waste retrieval.</p> |
| 23 * | <p>Material Streams: Sludge, Salt, Liquid (RL-HLW-20)</p> |
| 24 * | <p>TSD System: Double Shell Tank System and Single Shell Tank SystemDouble Shell Tank System</p> |
| 25 | <p>Major Contaminants: Pu-238, -239, -240, -241; Am-241; U-238; C-14; Ni-59/63; Nb-94; Tc-99; I-129; Cm-242; Sr-90; Cs-137; Sn-126; Se-79; chromium; nitrate; nitrite; complexants (EDTA/HEDTA).</p> |
| 26 | <p>Contaminated Media: Tank waste consisting of high molarity sodium hydroxide/sodium nitrate solution containing saturated saltcake and/or sludge.</p> |
| 27 | <p>Volume/Size of Contaminated Media: The single shell tanks are generally 75 ft. in diameter, and up to 40 feet deep with their tops buried about 10 feet below the ground surface. All double shell tanks are 75 feet in diameter, and about 40 feet deep, and are similarly buried.</p> |
| 28 * | <p>Earliest Date Required: 9/30/03 (approaches defined)</p> |

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| 29 * | <i>Latest Date Required:</i> 9/30/06 (approaches defined) |
| Baseline Technology Information | |
| 30 | <i>Baseline Technology/Process:</i> Running wastes through the 242-A Evaporator to reduce the volume. Constructing new DSTs and ultimately cleaning and closing the new tanks. |
| 31 | <i>Life-Cycle Cost Using Baseline:</i> \$75M for each new DST tank, plus the cost to maintain, operate, and then close the tank. |
| 32 | <i>Uncertainty on Baseline Life-Cycle Cost:</i> |
| 33 | <i>Completion Date Using Baseline:</i> |
| Points of Contact (POC) | |
| 34 | <i>Contractor End User POCs:</i> L. A. (Les) Fort, CHG, 509-376-0178, F/509-373-4641, Leslie_A_Les_Fort@rl.gov |
| 35 | <i>DOE End User POCs:</i> E.J. (Joe) Cruz, DOE-PRD, 509-372-2606, F/509-373-1313, E_J_Cruz@rl.gov B.M. (Billie) Mauss, ORP, 509-373-9876, F/509-372-2781, Billie_M_Mauss@rl.gov |
| 36 * | <i>Other Contacts:</i> A. F. (Anne-Marie) Choho, CHG, 509-372-8280, F/509-373-6382, Anne-Marie_F_Choho@rl.gov J.W. (Jerry) Cammann, CHG, 509-372-2757, F/509-373-6101, Jerry_W_Cammann@rl.gov K.A. (Ken) Gasper, CHG, 509-373-1948, F/509-376-1788, Kenneth_A_Ken_Gasper@rl.gov |

*Element of a Site Need Statement appearing in IPABS-IS

**Element of a Site Need Statement required by CHG